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EXAMINER	
TORRES, JUAN A	

ART UNIT	PAPER NUMBER
2631	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/964,200	RAFIE ET AL.	
	Examiner	Art Unit	
	Juan A. Torres	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) *29-34* is/are withdrawn from consideration.

5)☒ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☒ Claim(s) *1-19,22 and 24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 September 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group I: claims 1-28 in the reply filed on 03/18/2005 is acknowledged.

Claims 29-34 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 03/18/2005.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "208" has been used to designate both antenna and coupler. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of

any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to because:

a) In figure 2 the antenna block labeled "208" is improper; it is suggested to be labeled "210" (see page 5 line 2).

b) In figure 5 first input to block 532 is improper.

c) In figure 5 block labeled "506" is improper; it is suggested to be labeled "504" (see specification page 13 line 19 and lines 22-23).

d) In figure 5 block labeled "504" is improper; it is suggested to be labeled "506" (see specification page 13 line 20 and lines 26-30).

e) In figure 12 block labeled "1206" in the ordinate axis is improper; it is suggested to be labeled "1205" (see specification page 23 line 13).

f) Figure 14 is objected because it is not possible to discern with curve is which, and the resolution in pass part is very poor.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Figures 3, 4, 8 and 12 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

a) In FIG. 5 reference number 502 (see page 13 line 19 of the specification).

b) In FIG. 7 reference number 701 (see page 17 line 23 of the specification).

c) In FIG. 7 reference number 711 (see page 18 line 8 of the specification).

d) In FIG. 10 reference number 1011 (see page 21 line 7 of the specification).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

a) In page 1 line 21 the recitation (TBD) is improper.

b) In page 3 line 23 the recitation "RF input 124" is improper; it is suggested to be changed to "RF input 120".

c) In page 3 line 24 the recitation "RF input 124" is improper; it is suggested to be changed to "RF input 120".

d) In page 3 line 25 the recitation "120" is improper; it is suggested to be changed to "122".

e) In page 10 line 28 the recitation for C=[....] is improper.

f) In page 11 line 20 the recitation "FIG. 2" is improper; it is suggested to be changed to "FIG. 3".

g) In page 11 line 22 the recitation "200" is improper; it is suggested to be changed to "300".

h) In page 19 line 2 the recitation "FIG. illustrates" is improper; it is suggested to be changed to "FIG. 9 illustrates".

i) In page 19 line 15 the recitation "902" is improper; it is suggested to be changed to "904".

j) In page 20 line 17 the recitation "1020" is improper; it is suggested to be changed to "1022".

k) In page 23 line 14 the recitation "120" is improper; it is suggested to be changed to "1208".

Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

Claims 1-19 are objected to because of the following informalities: in line 16 of claim 1 the recitation "the high-power amplifier" is indefinite; it is suggested to be changed to "a high-power amplifier".

Claim 3 is objected to because of the following informalities: in line 2 of claim 3 the recitation "the linear" is indefinite; it is suggested to be changed to "a linear".

Claim 3 is objected to because of the following informalities: in line 2 of claim 3 the recitation "the nonlinear amplifier" is indefinite; it is suggested to be changed to "the nonlinear high-power amplifier".

Claim 5 is objected to because of the following informalities: in line 2 of claim 5 the recitation "the amplitude" is indefinite; it is suggested to be changed to "the pre-distorted amplitude".

Claim 5 is objected to because of the following informalities: in line 3 of claim 5 the recitation "the incoming complex" is indefinite; it is suggested to be changed to "the incoming QAM".

Claim 5 is objected to because of the following informalities: in line 6 of claim 5 the recitation "the appropriate" is indefinite; it is suggested to be changed to "an appropriate".

Claim 5 is objected to because of the following informalities: in lines 6-7 of claim 5 the recitation "the stored pre-distorted AM/AM gain characteristics" is indefinite; it is suggested to be changed to "the stored AM/AM characteristics".

Claim 9 is objected to because of the following informalities: in line 2 of claim 9 the recitation "the linear" is indefinite; it is suggested to be changed to "a linear".

Claim 9 is objected to because of the following informalities: in line 2 of claim 9 the recitation "nonlinear amplifier" is indefinite; it is suggested to be changed to "nonlinear high-power amplifier".

Claim 11 is objected to because of the following informalities: in line 2 of claim 11 the recitation "the phase" is indefinite; it is suggested to be changed to "the pre-distorted phase".

Claim 11 is objected to because of the following informalities: in line 3 of claim 11 the recitation "the incoming complex" is indefinite; it is suggested to be changed to "the incoming QAM".

Claim 11 is objected to because of the following informalities: in line 6 of claim 11 the recitation "the appropriate" is indefinite; it is suggested to be changed to "an appropriate".

Claim 11 is objected to because of the following informalities: in lines 6-7 of claim 11 the recitation "the stored pre-distorted AM/PM gain characteristics" is indefinite; it is suggested to be changed to "the stored AM/PM characteristics".

Claim 13 is objected to because of the following informalities: in line 8 of claim 13 the recitation "the feedback" is indefinite; it is suggested to be changed to "a feedback".

Claim 13 is objected to because of the following informalities: in line 9 of claim 13 the recitation "the sampled" is indefinite; it is suggested to be changed to "a sampled".

Claim 16 is objected to because of the following informalities: in line 6 of claim 16 the recitation "the span" is indefinite; it is suggested to be changed to "a span".

Claim 22 is objected to because of the following informalities: in line 3 of claim 22 the recitation "converter:" is improper; it is suggested to be changed to "converter.".

Claim 24 is objected to because of the following informalities: in line 3 of claim 24 the recitation "the mode" is indefinite; it is suggested to be changed to "the select mode".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 16 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification doesn't disclose span of pre-equalizer tap coefficients.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-15 and 17-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Wright (US 6697436).

As per claim 1 Wright discloses a method for combined digital pre-equalizing and pre-distorting signal processing of radio signals from a transmitter to multiple receivers over nonlinear channels with memory, the method comprising: transmitting packets of radio signals on a plurality of radio links in a radio system (figure 1 colum 1 lines 16-25); pre-distorting amplitude and phase of complex M-ary quadrature amplitude modulated (QAM) signal constellations generated for multiple radio links by the transmitter on the plurality of radio links using pre-distorter amplitude and phase lookup tables (column 2 lines 36-47); estimating and storing amplitude-amplitude (AM/AM) and amplitude-phase (AM/PM) characteristics of a nonlinear high-power amplifier through a calibration ramp signal as a function of M distinct ambient temperature values covering a desired dynamic operating temperature range (figure 46 column 2 lines 22-34 and column 54 lines 40-61); pre-distorting an incoming QAM signal by a complex gain which is a function of operating point of the high-power amplifier (HPA) (column 8 line 65 to column 11 line10); pre-equalizing transmitted bursts of multiple radio links using a programmable fractionally-spaced pre-equalizer with tap coefficients obtained from a calibrated system using an adaptive equalizer placed after a matching receiver square-root raised-cosine filter coupled to the high-power amplifier (HPA) (figure 30 column 41 line 40 to column 42 line 63 and column 52 lines 4-6 and figure 25B column 37 lines 4-9); and pre-equalizing amplitude and group-delay variations corresponding to composite transmit analog filters as well as distortion of digital-to-analog converter using K complex pre-stored tap coefficients (figure 30 column 42 lines 24-29 and figure 25B column 37 lines 4-9).

As per claim 2 Wright discloses a method for pre-distorting the amplitude of transmitted complex QAM signaling burst on the plurality of radio links using pre-characterized and pre-stored AM/AM lookup tables that are addressed based on operating point of the high-power amplifier associated with an active link of the plurality of radio links (figure 3 column 2 lines 22-34 and column 54 lines 40-61).

As per claim 3 Wright discloses a method for extracting the linear behavior of the nonlinear amplifier from stored AM/AM characteristics by generating M pre-distorted amplitude lookup tables and M pre-distorted phase lookup tables corresponding to M different temperature values (column 2 lines 22-34 and column 54 lines 40-61).

As per claim 4 Wright discloses a gain stage positioned prior to the high power amplifier of a signal path including the high power amplifier, setting a gain parameter value reflecting operating point of the high-power amplifier for the plurality of radio links (figure 1 column 7 line 66 to column 8 line 4).

As per claim 5 Wright discloses a method for selecting operating mode for addressing the amplitude lookup table based on one of squared magnitude of the incoming complex signal, real-squared magnitude and imaginary-squared magnitude, any operating mode could be used to get the appropriate table entry address for the stored pre-distorted AM/AM gain characteristics (figure 3 column 12 lines 54-64).

As per claim 6 Wright discloses a method for storing data in an additional lookup table, the data corresponding to characteristics of the high-power amplifier at different operating conditions of the high-power amplifier (figure 7 column 15 lines 48-63).

As per claim 7 Wright discloses a method for updating the data in the additional lookup table based on the stored characteristics of the high-power amplifier (figure 44 column 49 line 37 to column 51 line 27).

As per claim 8 Wright discloses a method for pre-distorting the phase of transmitted complex QAM signaling burst on the plurality of radio links using pre-characterized and pre-stored AM/PM lookup tables that are addressed based on operating point of the high-power amplifier associated with an active link of the plurality of radio links (figure 3 column 2 lines 22-34 and column 54 lines 40-61).

As per claim 9 Wright discloses a method for extracting the linear behavior of the nonlinear amplifier from stored AM/PM characteristics by generating M pre-distorted amplitude lookup tables and M pre-distorted phase lookup tables corresponding to M different temperature values (column 2 lines 22-34 and column 54 lines 40-61).

As per claim 10 Wright discloses a gain stage positioned prior to the high power amplifier of a signal path including the high power amplifier, setting a gain parameter value reflecting operating point of the high-power amplifier for the plurality of radio links (figure 1 column 7 line 66 to column 8 line 4).

As per claim 11 Wright discloses a method for selecting operating mode for addressing the phase lookup table based on one of squared magnitude of the incoming complex signal, real-squared magnitude and imaginary-squared magnitude, any operating mode could be used to get the appropriate table entry address for the stored pre-distorted AM/PM gain characteristics (figure 3 column 12 lines 54-64).

As per claim 12 Wright discloses a method for storing data in an additional lookup table, the data corresponding to characteristics of the high-power amplifier at different operating conditions of the high-power amplifier (figure 7 column 15 lines 48-63).

As per claim 13 Wright discloses a method for providing a pre-equalizer block (figure 30 column 42 lines 24-29 and figure 25B column 37 lines 4-9); providing a pre-distorter block coupled with the pre-distorter amplitude and phase lookup tables (column 8 line 65 to column 11 line10); providing a feedback path including a directional coupler to sample an output signal of the high-power amplifier (figure 2 block 62 column 9 lines 11-16); means for switching out the feedback path (figure 9 column 17 lines 49-52); cascaded filter means for bandlimiting and conditioning the sampled output signal (figure 2 block 66); and means for RF down conversion to baseband, analog-to-digital conversion, digital demodulation and symbol detection to provide a refined feedback signal to an adaptive algorithm block for updating complex coefficients of the pre-distorter amplitude and phase lookup tables (figure 2 blocks 66 and 68).

As per claim 14 Wright discloses a method for generating N sets of complex tap coefficients for the programmable fractionally-spaced pre-equalizer corresponding to N different desired operating frequency bands (figure 30 column 41 line 40 to column 42 line 63 and column 52 lines 4-6 and figure 25B column 37 lines 4-9).

As per claim 15 Wright discloses a method for measuring frequency responses of the desired frequency bands (figure 24B column 35 lines 35-41); and storing

appropriate resulting tap coefficients according to operating frequency bands for a given link (figure 25B column 37 lines 4-9).

As per claim 17 Wright discloses a method for transmitting one or more packets on a first radio link (figure 33 column 45 lines 1-30); and transmitting one or more packets on a second radio link (figure 33 column 45 lines 1-30).

As per claim 18 Wright discloses a method for retrieving stored pre-distortion data for the first radio link prior to transmitting on the first radio link (figure 33 column 45 lines 1-30); retrieving stored pre-distortion data for the second radio link prior to transmitting on the first radio link (figure 33 column 45 lines 1-30); and pre-distorting using the retrieved pre-distortion data (figure 33 column 45 lines 1-30).

As per claim 19 Wright discloses a method for retrieving stored pre-equalization data for the first radio link prior to transmitting on the first radio link(figure 33 column 45 lines 1-30); retrieving stored pre-equalization data for the second radio link prior to transmitting on the second radio link (figure 33 column 45 lines 1-30); and pre-equalizing using the retrieved pre-equalization data (figure 33 column 45 lines 1-30).

As per claim 20 Wright discloses a radio transmitter comprising: a high-power amplifier (figure 30 64 column 42 line 44); a signal amplitude and phase pre-distorter coupled with the high-power amplifier (figure 30 block 70A column 42 lines 10-12); one or more lookup tables coupled with the pre-distorter to store pre-distorter data related to operating characteristics of the high-power amplifier (detail in figure 3 block 52H column 11 lines 50-52); and a pre-equalizer coupled with the pre-distorter and the high-power amplifier (figure 30 block 70B column 42 line 38-62 and figure 25B column 37 lines 4-9).

As per claim 21 Wright discloses a filter circuit (figure 3 block 52A column 11 line 45); and a digital to analog converter (figure 1 block 54 column 7 lines 34).

As per claim 22 Wright discloses that the pre-equalizer is configured to compensate for variations introduced by the filter circuit and the digital to analog converter (figure 30 block 70B column 42 line 38-62 and figure 25B column 37 lines 4-9).

As per claim 23 Wright discloses a mode select input to receive a select mode signal (figure 9 column 17 lines 49-52).

As per claim 24 Wright discloses a power estimator responsive to the mode signal for estimating power of an input signal (figure 3 block 52C column 12 lines 54-56).

As per claim 25 Wright discloses that the power estimator is configured to estimate power of the input signal according to one of a squared magnitude of a complex input signal, a real squared magnitude of the complex input signal, and an imaginary squared magnitude (figure 3 column 12 lines 54-64).

As per claim 26 Wright discloses that the pre-distorter is configured to use the power estimate to index the lookup table (figure 3 column 12 lines 54-64).

As per claim 27 Wright discloses an automatic level control register to store a power level settings, the power level settings being used to determine gain of the pre-distorter (figure 1 column 7 line 66 to column 8 line 4).

As per claim 28 Wright discloses a feedback path including an adaptive block, the adaptive block being configured to update the pre-distorter data stored in the one or more lookup tables (figure 2 block 84 column 9 lines 11-16).

Claims 20-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Ham (Korean Patent Publication number 1020000031138A).

As per claim 20 Ham discloses a radio transmitter comprising: a high-power amplifier (figure 1 block 306); a signal amplitude and phase pre-distorter coupled with the high-power amplifier (figure 1 block 200); one or more lookup tables coupled with the pre-distorter to store pre-distorter data related to operating characteristics of the high-power amplifier (figure 1 block 202); and a pre-equalizer coupled with the pre-distorter and the high-power amplifier (figure 1 block 102).

As per claim 21 Ham discloses a filter circuit (figure 1 block 305); and a digital to analog converter (figure 1 block 302).

As per claim 22 Ham discloses that the pre-equalizer is configured to compensate for variations introduced by the filter circuit and the digital to analog converter (figure 1 loop with blocks 102 308 and 500).

As per claim 23 Ham discloses a mode select input to receive a select mode signal (figure 1 block 101).

As per claim 24 Ham discloses a power estimator responsive to the mode signal for estimating power of an input signal (figure 1 block 500).

As per claim 25 Ham discloses that the power estimator is configured to estimate power of the input signal according to one of a squared magnitude of a complex input

signal, a real squared magnitude of the complex input signal, and an imaginary squared magnitude (equations 1-3 in page 8-4).

As per claim 26 Ham discloses that the pre-distorter is configured to use the power estimate to index the lookup table (figure 1 block 203).

As per claim 27 Ham discloses an automatic level control register to store a power level settings, the power level settings being used to determine gain of the pre-distorter (figure 1 input to block 102 from block 501).

As per claim 28 Ham discloses a feedback path including an adaptive block, the adaptive block being configured to update the pre-distorter data stored in the one or more lookup tables (figure 1 block 400).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 20-28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Griph (US 6674808) and further in view of Leyendecker (US 5867065).

As per claim 20 Leyendecker discloses a radio transmitter comprising: a high-power amplifier (figure 6 block 103 column 10 line 30); one or more lookup tables coupled with the pre-distorter to store pre-distorter data related to operating characteristics of the high-power amplifier (figure 6 block 603 column 10 line 16-39); and a pre-equalizer coupled with the pre-distorter and the high-power amplifier (figure 7

column 10 lines 40-52). Leyendecker inherently describes a signal amplitude and phase pre-distorter coupled with the high-power amplifier (figure 6 block 601 column 6 lines 23-39), but he doesn't specifically disclose a signal amplitude and phase pre-distorter coupled with the high-power amplifier. Griph specifically discloses a signal amplitude and phase pre-distorter coupled with the high-power amplifier (figure 1 block 52 and 54 column 6 lines 23-39). Leyendecker and Griph are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the phase and magnitude errors disclosed by Griph with the pre-distorter disclosed by Leyendecker. The suggestion/motivation for doing so would have been to specifically incorporate the phase and magnitude errors (Griph abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 20.

As per claim 21 also Griph discloses a filter circuit (figure 1 block 28 column 4 line 41); and a digital to analog converter (figure 1 after block 20 column 3 lines 65-66). Griph and Leyendecker are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the lookup tables disclosed by Leyendecker with the equalized distorted disclosed by Griph. The suggestion/motivation for doing so would have been to reduce the setup time and to increase the accuracy of the predistortion (Leyendecker abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 21.

As per claim 22 Griph also discloses that the equalizer is configured to compensate also for variations introduced by the filter circuit and the digital to analog converter (figure 1 block 15 column 5 lines 30-42). Griph and Leyendecker are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the lookup tables disclosed by Leyendecker with the equalized distorted disclosed by Griph. The suggestion/motivation for doing so would have been to reduce the setup time and to increase the accuracy of the predistortion (Leyendecker abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 22.

As per claim 23 Leyendecker also discloses a mode select input to receive a select mode signal (figure 8 block 806 column 13 line 19-33). Griph and Leyendecker are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the lookup tables disclosed by Leyendecker with the equalized distorted disclosed by Griph. The suggestion/motivation for doing so would have been to reduce the setup time and to increase the accuracy of the predistortion (Leyendecker abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 23.

As per claim 24 Leyendecker also discloses a mode select input to receive a power estimator responsive to the mode signal for estimating power of an input signal (figure 11 block 1101 column 12 lines 46-49). Griph and Leyendecker are analogous art

because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the lookup tables disclosed by Leyendecker with the equalized distorted disclosed by Griph. The suggestion/motivation for doing so would have been to reduce the setup time and to increase the accuracy of the predistortion (Leyendecker abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 24.

As per claim 25 Leyendecker also discloses that the power estimator is configured to estimate power of the input signal according to a squared magnitude of a complex input signal, or inherently to a real squared magnitude of the complex input signal, and an imaginary squared magnitude (figure 11 block 1101 column 12 lines 46-57). Griph and Leyendecker are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the lookup tables disclosed by Leyendecker with the equalized distorted disclosed by Griph. The suggestion/motivation for doing so would have been to reduce the setup time and to increase the accuracy of the predistortion (Leyendecker abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 25.

As per claim 26 Leyendecker also discloses that the pre-distorter is configured to use the power estimate to index the lookup table (figure 11 column 12 lines 41-57). Griph and Leyendecker are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of

ordinary skill in the art to incorporate the lookup tables disclosed by Leyendecker with the equalized distorted disclosed by Griph. The suggestion/motivation for doing so would have been to reduce the setup time and to increase the accuracy of the predistortion (Leyendecker abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 26.

As per claim 27 Leyendecker also discloses an automatic level control register to store a power level settings, the power level settings being used to determine gain of the pre-distorter (figure 6 block 603 column 10 lines 26-39). Griph and Leyendecker are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the lookup tables disclosed by Leyendecker with the equalized distorted disclosed by Griph. The suggestion/motivation for doing so would have been to reduce the setup time and to increase the accuracy of the predistortion (Leyendecker abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 27.

As per claim 28 Leyendecker also discloses a feedback path including an adaptive block, the adaptive block being configured to update the pre-distorter data stored in the one or more lookup tables (figure 6 block 613 column 10 lines 26-39 and figure 4 column 4 lines 36-44). Griph and Leyendecker are analogous art because they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the lookup tables disclosed by Leyendecker with the equalized distorted disclosed by Griph. The

suggestion/motivation for doing so would have been to reduce the setup time and to increase the accuracy of the predistortion (Leyendecker abstract). Therefore, it would have been obvious to combine Leyendecker and Griph to obtain the invention as specified in claim 28.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Huang (US 4276514) discloses a low distortion phase compensated wideband amplifier system includes a low cost, power efficient Class C amplifier positioned along a primary signal path and a feedback loop coupled to provide negative feedback of distortion signal components in the amplified output signal; the negative feedback significantly reduces noise components including intermodulation noise while variable delay phase compensation permits a greater signal to noise ratio over a broader band of frequencies at the system output. Twitchell (US 6335767) discloses a broadcast transmission systems and is particularly directed to compensation of distortion within a digital transmission system. Dolman (US 6396345) discloses a phase and amplitude detector and a method of determining errors, and is particularly, but not exclusively, applicable to the measurement of phase and amplitude errors for compensation purposes in the linearization of power amplifiers. Danielsons (US 6751266) discloses RF transmitters employing linear and non-linear pre-correctors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is (571) 272-3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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03-23-2005

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